Perinatal mortality in non-Western migrants in Norway: comparison with their country of birth and with Norwegian women

Zainab Naimy§1, Jostein Grytten1, 2, Lars Monkerud2, Anne Eskild1, 4

1 Department of Obstetrics and Gynecology, Institute of Clinical Medicine, Akershus University Hospital, Lorenskog, Norway

2 Department of Community Dentistry, University of Oslo, Oslo, Norway

3 BI Norwegian Business School, Oslo, Norway

4 Department of Mental Health, Norwegian Institute of Public Health, Oslo, Norway

§ Corresponding author: Zainab Naimy

Email addresses:

ZN: zainab.naimy@ahus.no

JG: j.i.grytten@odont.uio.no

LM: lars.monkerud@bi.no

AE: anne.eskild@medisin.uio.no
Abstract

Background
A large number of women from countries with high perinatal mortality rate (PMR) settle in countries with low PMR. We compared the PMRs for migrants in Norway with the PMR in their country of birth. We also assessed the risk of perinatal death in offspring of migrant women as compared to offspring of Norwegian women.

Methods
For this registry based study, the Medical Birth Registry of Norway and the Norwegian Central Person Registry provided data on births in Norway from 1986 to 2005 among all women born in Norway, Pakistan, Vietnam, Somalia, Sri Lanka, Philippines, Iraq, Thailand and Afghanistan. Information on the PMR in the country of birth was obtained from the World Health Organisation (WHO) for the years 1995, 2000 and 2004. The PMRs in Norway were calculated by mother’s country of birth, and the risk of perinatal death by country of birth was estimated as odds ratios (OR) using Norwegian women as the reference. Adjustment was made for mother’s age, plurality, parity and year of birth.

Results
The PMR for migrant groups in Norway was lower than in their country of birth. The largest difference was in Afghan women (97 deaths per 1000 births in Afghanistan versus 24 deaths per 1000 births in Afghan women in Norway), followed by Iraqi and Somali women. As compared with Norwegian women, the adjusted odds ratio (OR) of perinatal death was highest for Afghan (OR 3.84 CI: 2.33 – 6.32), Somali (OR 1.88 CI: 1.48 - 2.38) and Pakistani (OR 1.87 CI: 1.59 – 2.19) women.
Conclusions
The lower PMRs for migrants in Norway as compared to the PMR in their country of birth may be explained by access to better health care after migration. The increased risk of perinatal death in migrants as compared to Norwegians encourages further research.

Keywords
Migrant, perinatal mortality rate, perinatal death, maternal health.

Background
The numbers of international migrants have been increasing over the past decades. With 175 millions migrants in 2000, the total number is predicted to rise to 230 million by 2050 [1]. Many migrant women are in a childbearing age, and maternal health outcomes in these women have become a key priority for many governments [2]. Reflecting the increased focus on migrant women and their reproductive health, the international research collaboration Reproductive Outcomes and Migration (ROAM) was established in 2004 [3]. The main goal of this collaboration has been to study the relationship between migration and reproductive health. Thus, perinatal health outcomes have been recommended to be reported by country of birth [4].

A recent review of studies on stillbirth and infant death among migrants in industrialized countries found higher mortality in migrants compared to the native population in half of the studies. In the remaining studies similar or lower mortality was found [5]. In Europe, offspring of non-European migrants were consistently found to have higher perinatal
mortality rates (PMRs) than the native population [5]. However, comparison between studies may be difficult as the definition of migrants vary across studies [5, 6].

Although the risk of perinatal death is higher in non-Western migrants than in the native population, the risk is likely to be lower than in their country of birth. The PMR in migrant women’s country of birth as compared to the PMR for offspring of migrant women in their new country has not, to our knowledge, been systematically reported. Such a difference may be an indirect measure of the effect of the health care services in reducing the PMR.

Norway has one of the lowest PMRs in the world [7] and the public health system provides free access to antenatal and obstetric care to all women. Pakistan, Viet Nam, Somalia, Sri Lanka, Philippines, Iraq, Thailand and Afghanistan have some of the highest PMRs in the world [7]. Women from these countries represent some of the largest non-Western migrant groups in Norway [8] and they give birth to approximately 50% of all infants born to non-Western migrants. We compared the mean PMRs in these migrant groups in Norway from 1986 to 2005 with the PMRs in their countries of birth [7, 9, 10]. We also studied the risk of perinatal death in offspring of migrant women as compared to offspring of Norwegian women. Adjustment was made for differences in mother’s age, plurality, parity and year of giving birth.

**Methods**

**Study design**

The PMRs in Pakistan, Somalia, Viet Nam, Sri Lanka, Iraq, Philippines, Thailand and Afghanistan were obtained from the WHO reports on perinatal mortality for the years 1995, 2000, and 2004 [7, 9, 10]. Mean PMRs in Norway from 1986 to 2005 by country of birth
were obtained by linkage between the Medical Birth Registry of Norway [11] with the Central Person Registry of Norway [12]. The Medical Birth Registry contains information on all births in Norway, including offspring death before or at birth. The information is compulsorily reported by the health professionals attending the delivery [11]. Information on country of birth and early neonatal death (before day seven after birth) was obtained from the Central Person Registry of Norway [12].

**Study population and setting**

In order to study risk of perinatal death in offspring of migrant women compared to Norwegian women, we included births in Norway from 1986 to 2005 with a gestational age at birth above 22 weeks. A total of 1,108,331 births from 1986 to 2005 met our inclusion criteria, 5,364 of these births were excluded because of missing information on perinatal vital status. These excluded births represented less than one percent of the births in every migrant group and in Norwegian women. No births were excluded because of missing information on independent variables. We included births among women born in Pakistan (11,351), Viet Nam (6,169), Somalia (5,410), Sri Lanka (4,933), Philippines (4,662), Iraq (3,829), Thailand (3,204) and Afghanistan (665) and births among Norwegian women (1,062,744). A woman was defined as Norwegian if both her parents were born in Norway. Women from other non-Western or Western migrant groups were not included.

**Variables**

Perinatal Mortality Rate (PMR) was defined as offspring death after 22 weeks of gestation and before seven completed days after birth per 1000 births (live and stillborn) [9]. For births before 1999, gestational age at birth was calculated from the date of last menstrual period, whereas after 1999, gestational age was based on estimations of term date at routine fetal
ultrasonographic examinations in week 17-19 [13]. Where information on gestational age at birth was missing, births of offspring with birth weight above 500 grams were included [14]. Mother’s country of birth was coded; Pakistan, Viet Nam, Somalia, Sri Lanka, Philippines, Iraq, Thailand, Afghanistan and Norway. Mother’s age at birth, plurality, parity, and year of giving birth as obtained from the Medical Birth Registry [11], were included as control variables in the analyses. Mother’s age was categorized as ≤20, 20-24, 25-29, 30-34 and ≥35 years, plurality was categorized as singleton and multiple births. Parity was categorized as 0, 1, 2 and 3 or more previous deliveries and year of giving birth as 1986-1990, 1991-1995, 1996-2000, 2001-2005.

**Statistical methods**

Mean PMRs for migrant groups in Norway during the period 1986 to 2005 were calculated and compared with the WHO estimates of PMR in their country of birth for the years 1995, 2000 and 2004. The risk of perinatal death according to mother’s country of birth was estimated as crude and adjusted odds ratios (OR) with 95% confidence intervals (95% CI). Norwegian women were used as the reference. Adjustments were made for maternal age at delivery, plurality, parity, and year of giving birth.

**Results**

The mean PMRs for migrant groups in Norway during the period 1986 to 2005 were lower than the PMRs in their country of birth in 1995, 2000 and 2004 (Table 1). When using the WHO figures from 2004, the largest absolute difference in PMR was seen in Afghan women, with 97 deaths per 1000 births in Afghanistan versus 24.1 deaths per 1000 births in Afghan women in Norway. The second largest difference was for Iraqi women, followed by Somali
women. For women from countries with a relative low PMR, such as Sri Lanka, the absolute difference between the PMR in the country of birth in 2004 and the PMR in Norway was small.

The PMR for offspring of Norwegian women (7.6 per 1000) was lower than for all migrant groups, except for offspring of Vietnamese women (7.1 per 1000) (Table 1). As compared with Norwegian women, the crude OR for perinatal death was especially high in Afghan (OR 3.21 CI: 1.96 – 5.28), Pakistani (OR 1.85 CI: 1.58-2.17), Somali (OR 1.73 CI: 1.37-2.19) and Sri Lankan (OR 1.63 CI: 1.26 – 2.10) women (Table 2). The crude OR for offspring of Vietnamese women was 0.94 (CI: 0.69 - 1.26).

The perinatal mortality declined in Norway during the study period, and most births to Afghan, Iraqi and Somali women occurred after the year 2000 (Table 3). Overall migrant women differed from Norwegian women in being more often multiparous, having less multiple births and more often being above 35 years of age at delivery (Table 3). After adjustment for these factors, the OR of offspring death according to migrant groups did not change significantly (Table 2). Multiparity, multiple births, maternal age less than 20 or above 35 years, and giving birth before 2001 were all factors associated with increased risk of perinatal death.

Discussion

Key results

For non-Western migrants the perinatal mortality rate (PMR) was up to 9 times higher in their country of birth than in Norway (Table 1). The difference in PMRs between the country of birth and the host country was largest for offspring of Afghan, Iraqi and Somali women.
Nevertheless, the risk of perinatal death was higher in offspring of migrant women than in offspring of Norwegian women. For Afghans the risk of perinatal death was three times higher than in Norwegians.

**Limitations**

The first WHO report on perinatal mortality in 1995 initiated improved recording of country specific PMR [9]. However, the accuracy of reporting and the legal requirements for notification of fetal deaths and live births still vary by country [7, 9]. While the WHO perinatal mortality estimates cannot be interpreted as precise figures of the PMR in each country, the WHO methodology for estimating PMRs has improved since 1995 [7, 9]. In Figure 1, the difference between the PMR in the country of birth in 2004 and the mean PMRs for migrants in Norway during 1986 to 2005 may represent underestimates, as the risk of perinatal death in Norway was more than halved during this time period. However, most births among migrants were towards the end of this time period. We decided to include all births in Norway from 1986 to 2005 to provide statistical power.

Sri Lankan migrants in Norway are mainly Tamils from the conflict affected regions of Sri Lanka [15]. In these regions higher rates of stillbirths, neonatal and maternal deaths have been reported [16-18]. By using the PMR for Sri Lanka as a whole for comparison, the difference in PMRs between the conflict affected regions of Sri Lanka and the host country may be underestimated for the Tamils. In Iraq the PMR nearly doubled from 1995 to 2004 [7, 10]. The difference between the PMR in Iraq in 2004 and the PMR for Iraqi migrants in Norway may therefore represent overestimates.

Most migrant groups in Norway had higher risk of perinatal death than Norwegians. In the analyses we made adjustments for maternal age at delivery, plurality, parity and year of birth. However, we lacked information on social and behavioral factors that could help explain the
differences in risk [19]. Due to the time consuming process of updating national registries, we lacked complete information on perinatal deaths by country of birth beyond 2005. However, there are no indications that our results should not be valid beyond this time period.

**Other studies**

To our knowledge, no prior studies have compared PMRs in migrants in their host country with the PMRs in their country of birth. However, risks of perinatal death in migrants as compared to the native population in the host country have been reported. Refugees and non-European migrants in Europe and also foreign born blacks in the United States have high excess perinatal mortality compared to the native population [5]. Studies from Norway and Sweden report increased risk of perinatal death in offspring of Somali women in particular [5, 20]. In the United Kingdom offspring of women born in Pakistan are at high risk [21]. Overall the PMRs in these Western countries, in particular the Scandinavian countries, are among the lowest in the world [7].

To our knowledge, the PMRs for Sri Lankan, Pilipino, Iraqi, Thai and Afghan migrants have not yet been reported from any European country.

**Interpretation**

Our results suggest that migrants from countries with high PMRs benefit substantially from the health care services in Norway. The difference between the PMRs in Norway and country of birth may thus be an indirect measure of the effect of quality health care available to all women in attaining low PMR. However, low PMR in migrants in Norway may also be explained by other factors that affect women’s health, like improved housing, sanitation and educational opportunities in Norway.

Despite access to quality health care in Norway, most migrant groups have a higher PMR than Norwegian women. The majority of Afghan, Iraqi, Somali, Vietnamese and Sri Lankan
women in Norway are either refugees or migrated for unification with a family member with refugee status in Norway [22]. Refugees are more likely to have been affected by malnutrition, psychological distress and lack of health care services than people who have been able to plan their migration [23]. In Norway, refugees and their families have substantially worse living conditions than the rest of the population, especially if they are newly settled [24]. As the majority of Afghan, Iraqi and Somali migrants had lived in Norway for less than five years in 2004 [24], we assume that their acculturation process is at a premature stage. Their health seeking behavior and cultural practices concerning pregnancy and childbirth may thus be similar to those in their country of birth. Cultural practices such as reducing food intake to avoid large sized infants and thereby complicated deliveries, have been reported in Somali women residing in Sweden [25]. The low risk of perinatal death in Iraqi migrants as compared to other migrant groups may partially be due to a better adaption to the Norwegian health care system, since Iraq had a well-functioning health care system and low PMR in the 1980s [26], [27]. Though, after the initiation of the United Nations sanctions against Iraq and the Gulf war in 1990, the PMR increased [27].

Vietnamese women may have fewer barriers in accessing healthcare as the majority have lived in Norway for over 10 years and are well-integrated in the Norwegian society [22]. Also, the low risk of perinatal death in Vietnamese migrants in Norway may be due to their background as political refugees, thus representing a more advantageous socioeconomic background [28]. This selection, described as “healthy migrant effect” may explain the low PMR for some migrant groups in Norway [29].

The majority of Pakistani women migrate to Norway after marrying a man with Pakistani background living in Norway [30]. In Pakistani migrants consanguineous marriages are common and may contribute to 29% of the stillbirths and infant deaths in this group [31]. Furthermore, the high prevalence of diabetes in South-Asian women in Norway has been
linked to adverse pregnancy outcomes [32]. The lower risk of perinatal death in offspring Thai and Filipino women compared to other migrant groups may partially be associated with 84-95 % of these women being married to a Norwegian man [30]. This may ease their acculturation process into the Norwegian society, making it easier to pass cultural and communication barriers in accessing health care services.

As perceptions of somatic symptoms may differ by culture [21], there may also be cultural determinants of perinatal care. Non-Western migrants in Norway and in the Netherlands have been found to be less prone to attend the antenatal care program, with fewer numbers of antenatal visits and subsequently poorer detection of complications [33–35]. Furthermore, inadequate communication in perinatal care to non-Western migrants has been reported in Norway, Sweden and the Netherlands [34–37], suggesting that problems in interpretation of clinical symptoms may have been disturbed [37]. Suboptimal factors in perinatal care, such as inadequate medication, insufficient surveillance of intrauterine growth restriction (IUGR) and refuse of Caesarean-sections by mothers has been reported in Somali women in Sweden [36], and may be due to miscommunication. The mechanisms behind the health seeking behavior of migrant women and the cultural framework used by these groups in articulating their symptoms are insufficiently understood. Thus conclusions on how to lower the risk of perinatal death in offspring of migrant women are difficult to reach. Further research on risk factors of perinatal death in migrants should be encouraged.

**Conclusion**

The lower perinatal mortality rates (PMRs) in migrants in Norway as compared to their country of birth, emphasizes the importance of quality health care in perinatal mortality
reduction. There is however, an increased risk of perinatal death in many migrant groups compared to native Norwegian women that needs further attention.

List of abbreviations

CI: Confidence interval, OR: Odds ratio, PMR: Perinatal mortality rate, WHO: World Health Organization.

Competing interests

The authors declare that they have no competing interests.

Authors’ contributions

AE developed the design for the study, with input from the other authors. Statistical computations were carried out by LM with direction and input from JG, who also collected the data. Interpretation of data involved ZN and AE. The manuscript was drafted by ZN and AE. All authors read and approved the final manuscript.

Acknowledgements

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Ethical approval

We have used data from the Medical Birth Registry of Norway, and this registry is approved by the Norwegian Data Inspectorate. The Medical Birth Registry of Norway has approved this study for publication.

Funding

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References


Figures

Figure 1 - Perinatal mortality rates (PMRs) in migrants in Norway and PMR in their country of birth*.

Figure legend: * Figures obtained from the World Health Organisation [7].

Tables

Table 1 - Perinatal mortality rates (PMR) in migrants in Norway and PMR in their country of birth*.

<table>
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<td>97</td>
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Table legend: Perinatal Mortality Rates (PMR) in the country of birth of migrant groups living in Norway for the years 1995, 2000 and 2004. Mean PMRs in Norway by country of birth from 1986 to 2005. * Figures obtained from the World Health Organisation [7].
Table 2 - Numbers and odds ratios (ORs) of perinatal death by country of birth, and background factors.

<table>
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<tr>
<th>Background factors</th>
<th>Perinatal deaths (n)</th>
<th>Perinatal deaths (n)</th>
<th>Crude OR (95% CI)</th>
<th>Adjusted OR (95% CI)</th>
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<td></td>
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<td>1054647</td>
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<td>182964</td>
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<td>69174</td>
<td>1.37 (1.27 – 1.48)</td>
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<td>2001 – 2005</td>
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Table legend: Numbers and crude and adjusted odds ratios (OR) with 95% confidence intervals (CI) for perinatal death according to country of birth and other study factors in women giving birth in Norway from 1986 to 2005 (n= 1 102967)
Table 3 - Characteristics of women who gave birth in Norway 1986 - 2005 by country of birth

<table>
<thead>
<tr>
<th>Year of birth</th>
<th>Number of births</th>
<th>Mother’s age at birth</th>
<th>Parity</th>
<th>Plurality</th>
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<tr>
<td></td>
<td>Pakistan (%)</td>
<td>Vietnam (%)</td>
<td>Somalia (%)</td>
<td>Sri Lanka (%)</td>
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<tr>
<td>1986-1990</td>
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<tr>
<td>2004-2007</td>
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Number of births: 11351; 6169; 5410; 4933; 4662; 3829; 3204; 665; 1062744

Mother’s age at birth

-20 357 (3.1) 158 (2.6) 193 (3.6) 57 (1.2) 61 (1.3) 157 (4.1) 84 (2.6) 22 (3.3) 36847 (13.5)
20-24 3478 (30.6) 1446 (23.4) 1189 (22.0) 844 (17.1) 703 (15.1) 868 (22.7) 634 (19.8) 201 (30.2) 213680 (20.1)
25-29 3979 (35.0) 2201 (35.7) 1836 (33.9) 1835 (37.2) 1498 (32.1) 1336 (34.9) 1059 (33.0) 240 (36.1) 385434 (36.3)
30-34 2353 (20.7) 1560 (25.3) 1438 (26.6) 1542 (31.3) 1483 (31.8) 984 (25.7) 880 (27.5) 135 (20.3) 300206 (28.25)
35+ 1184 (10.4) 804 (13.0) 754 (13.9) 635 (13.3) 917 (19.7) 484 (12.6) 547 (17.1) 67 (10.1) 126577 (11.9)

Plurality

Singleton 11087 (97.7) 6082 (98.6) 5276 (97.5) 4821 (97.7) 4579 (98.2) 3713 (97.0) 3123 (97.5) 649 (97.6) 1029500 (96.9)
Multiple 264 (2.3) 87 (1.4) 134 (2.5) 112 (2.3) 83 (1.8) 116 (3.0) 81 (2.5) 16 (2.4) 33244 (3.1)

Parity

<table>
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<th>Year of birth</th>
<th>Year of birth</th>
<th>Year of birth</th>
<th>Year of birth</th>
</tr>
</thead>
<tbody>
<tr>
<td>1986-1990</td>
<td>2368 (20.9)</td>
<td>957 (15.5)</td>
<td>135 (2.5)</td>
</tr>
<tr>
<td>1991-1995</td>
<td>2595 (22.8)</td>
<td>1676 (27.2)</td>
<td>762 (14.1)</td>
</tr>
<tr>
<td>1996-2000</td>
<td>2959 (26.1)</td>
<td>1717 (27.8)</td>
<td>1569 (29.0)</td>
</tr>
<tr>
<td>2001-2005</td>
<td>3429 (30.2)</td>
<td>1819 (29.5)</td>
<td>2944 (54.4)</td>
</tr>
</tbody>
</table>

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Figure 1

PMR in country of birth: 2004

PMR in Norway by country of birth: 1986-2005